Try harder! The influence of evaluative feedback on the pupil dilation response, saliva cortisol, and saliva alpha-amylase levels during listening.

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Nachtegaal et al., 2009
Without motivation, there is no listening effort
Can social pressure influence motivation and effort?
Aim: to assess the influence of “social evaluative threat” on:
- Speech perception performance,
- The pupil dilation response during listening (effort)
- Subjectively experienced hearing difficulties
- And two biomarkers sensitive to stress
Pupil dilation response: listening effort

Zekveld et al., 2010
Two stress systems: biomarkers

- Sympathetic system (fast)
- HPA system (slow)
Two stress systems: biomarkers

**Sympathetic system (fast)**
- Pupil dilation
- Salivary alpha-amylase

**HPA system (slow)**
Two stress systems: biomarkers

**sympathetic system**
- Pupil dilation
- Salivary alpha-amylase

**HPA system**
- Cortisol
Speech reception threshold (SRT) test

- Monaurally presented,
- Adaptive and interleaved SRT task
- Targeting either 50% (difficult) or 71% (easy) correct perception of the target sentence (female voice) presented in interfering speech (male voice)
- Overall intensity level: 65 dB SPL; application of NAL-R.
Participants

34 participants with normal hearing (NH):
- Mean age = 52 years, age range 25-67 years;
- Mean best ear pure-tone average (PTA) @ 1, 2 & 4 kHz = 8.1 dB HL

29 participants with hearing impairment (HI):
- Mean age = 52 years, age range 23-64 years;
- Mean best ear PTA @ 1, 2 & 4 kHz = 48.6 dB HL.
Feedback condition*

- Feedback (visual, after each trial)
- “Peer” performance (social evaluative threat)
- Target performance for “useful data collection” (75% correct)
- Lower actual performance (60% correct)
- Verbal feedback twice during the task

* Based upon “Montreal Imaging Stress task”
Feedback condition: between subjects

- Standard SRT test, no feedback (control):
  - N = 17 NH, mean age = 52 years,
  - N = 15 HI, M age = 49 years;

Adapted SRT test with feedback:
- N = 17 NH, M age = 52 years, and
- N = 14 HI, M age = 55 years;
Time line: 2 hour test session (afternoon)

~70 minutes

~45 minutes

Baseline

SRT Test

End
Hypotheses

Feedback associated with:

- Better performance
- More effort (pupil)
- Higher stress levels (biomarkers)
- Higher subjectively experienced effort / stress level
Speech reception thresholds (SRTs)

- Normal hearing: better performance than hearing impaired
- Difficult < Easy
- Feedback: better performance in easy condition
Pupil response (listening effort)

- Larger pupil dilation for difficult (compared to easy) condition
- Larger pupil dilation in feedback condition
Cortisol (stress)

- No effect of Feedback or Hearing status

- At baseline: higher cortisol than later in test session; reflects daily pattern

- Alpha-amylase: similar pattern of results
Subjective ratings

- No effects of Hearing status

- Effects of Feedback:
  - More effort!
  - More difficult!
  - More often giving up!
  - Less self-assurance!
  - Lower performance!
  - More stress!
Conclusions

- Feedback influences:
  - Speech perception performance,
  - Subjective difficulties
  - The pupil dilation response / effort

- No effect on stress biomarkers
  (cortisol, alpha-amylase)
Thank you for listening